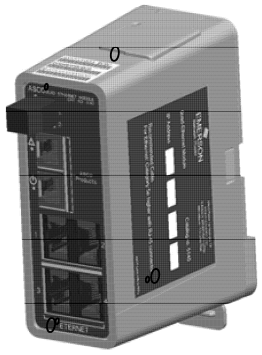
Installation Manual

ASCO® 5100 Series, Catalog 5140
Quad-Ethernet Module
Accessory 72EE for New Series 300 Transfer Switches, (with Group G controller) & 5210 Digital Power Meter



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EMERSON Network Power

Introduction

The ASCO Catalog 5140 Quad-Ethernet Module (QEM) is a stand-alone Ethernet switch and data concentrator. It allows users to communicate with the new family of devices made by ASCO Power Technologies over a local area network (LAN) or over a secure Internet connection. If the 5140 QEM is provided on a New Series 300 Transfer Switch, it is designated as Accessory 72EE. The Group G controller firmware must be version 11 or higher for transfer and retransfer capabilities.

Purpose of this Manual

This manual should be used to assist individuals who:

- will install and configure the 5140 QEM
- will monitor / control devices made by ASCO Power Technologies by using the 5140 QEM's built-in web pages
- will communicate with ASCO Power Technologies products through the 5140 QEM by using a Modbus TCP-based monitoring system (BMS or SCADA)
- will capture / read data from the 5140 QEM by using SNMP

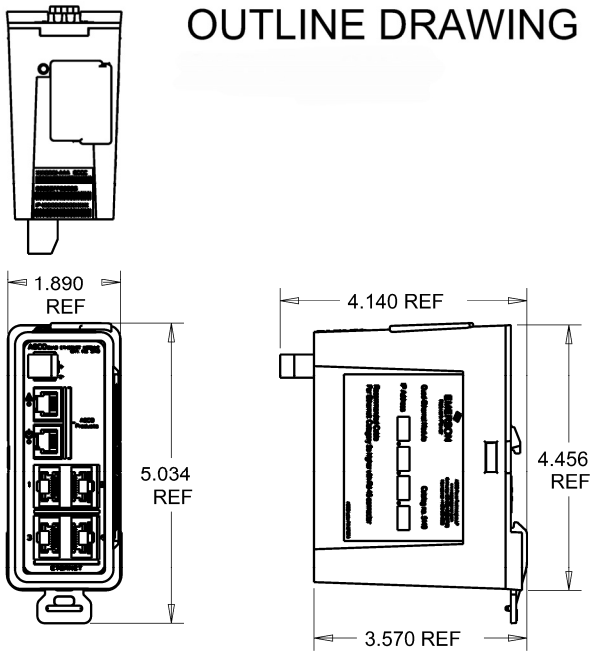
For specific LAN details contact the LAN administrator or IT specialist.

If the 5140 QEM is provided as Acc. 72EE on a New Series 300 Transfer Switch, refer to the transfer switch installation manual, controller user's guide, and wiring diagram.

General Specifications

Voltage:	24 V dc
Power Requirements:	1.7 W
Mounting:	DIN mount vertical
Dimensions (L,H,W):	4" x 5" x 2" (4 cm, 11 cm, 10 cm)
Ambient Temperature:	-4° F to 158° F(-20° C to +70° C)
Ports:	2 (yellow stripe) for ASCO devices 4 (blue stripe) for Ethernet

OUTLINE DRAWING



Installation

The 5140 QEM mounts on a standard 35 mm DIN rail (not supplied). To release it from the DIN rail, pull down on the handle at the bottom. A power terminal plug is provided. Connect the device(s) from ASCO Power Technologies to the upper ports (yellow stripe). Connect the Ethernet network to the lower ports (blue ports). Use Category 5e or higher cable with RJ-45 connectors.

Tip Communication Address form is included at the back to help you fill in needed information on your QEM.

The 5140 Quad-Ethernet Module provides Ethernet-access that allows users to view data from New Series 300 Transfer Switches, and 5210 Digital Power Meters. All users must follow these precautions:

⚠ DANGER To avoid possible shock, burns, or death, deenergize all electrical sources to the Transfer Switch before installing the 5140 Quad-Ethernet Module.

NOTICE **Be sure that *Users* to whom you give access are those persons that you want to view information about the electrical system.**

Windows and *Internet Explorer* are registered trademarks of Microsoft Corporation.

Access Levels and Passwords

The 5140 QEM has three different levels of user access. The importance of these levels varies based on the interface method that is selected. The 5140 QEM is shipped with three preset user IDs and default passwords. The three user IDs cannot be changed. The passwords can be changed by the **admin** level user. During the initial on-site configuration the passwords should be changed as needed.

User IDs (lower case) cannot be changed	Access Level	Default Password (upper case) 15 characters maximum	New Password
monitor	View access: can view status and webpages, cannot transfer or retransfer load, or make changes.	ASCO	
control	Control access: can transfer and retransfer load (ATS), cannot change any configuration settings.	ASCO	
admin	Full access: can set passwords and change all configuration settings of the 5140 QEM.	ASCO	

NOTICE **Be sure that users to whom you give control access are those persons that you want to be able to control the electrical system.**

How to change a password

On any QEM web page, click the **Configuration** tab. Click the **Press to Change Password** button. In the ***Change Password*** window, type the *User ID* (admin level), type the old password and the new password. Then click **Submit**, and a message should indicate that the password was changed.

Figure 2-1. Configuration screen.

Type **monitor**, **control**, or **admin** (lower case).

Figure 2-2. Change password screen.

Addresses

The MAC address and the default IP address are located on the outside of the 5140 QEM. Refer to the **About** webpage for determining the IP address and MAC address.

Address	Default Address	New Address
IP Address	169.254.001.001	
MAC Address	00:0C:99:____:____:____.	The MAC Address cannot be changed by the user

Webpage Interface

The 5140 QEM has built-in web pages that allow the user to monitor and control the downstream capable devices made by ASCO Power Technologies. A computer (or any web-enabled product, including smart phones and tablets) and a connection to the 5140 QEM over Ethernet will give the user access to data.

User Requirements

- The user has a computer or web-enabled device that has been configured to communicate over a network to the 5140 QEM. The most common web-enabled device would be a computer and the most common network connection would be over a LAN (local area network). The setup and testing of this network can be viewed in the Configuration area of this manual**.**
- The user has been provided the IP address of the 5140 QEM as well as a User Name and Password for access. It is possible that the information is still the default settings but may have been changed during setup.
- The user's intranet access software or web browser needs to be one supported by the 5140 QEM. The 5140 QEM supports most web browsers but was designed for *Internet Explorer* 8.0 or higher.

Getting Connected to the 5140 QEM over the Ethernet

Open the web browser of the web-enabled device that will be used to view the 5140 QEM web pages. The default IP address is 169.254.1.1. Type the correct IP address in the address bar and press *Enter*. See Figure 3-1.

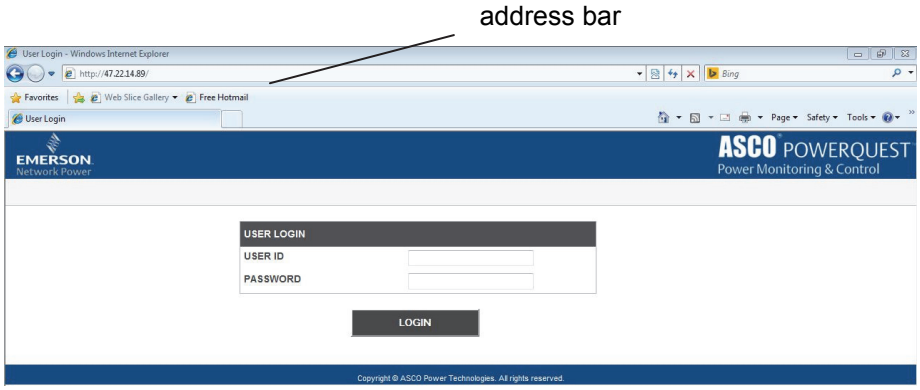


Figure 3-1. Login screen.

The webpage should show a **Login** page. If the webpage appears it indicates that all of the network configurations were done correctly. If the Login page is not displayed, the setup needs to be reviewed. Common causes for not being able to connect to the 5140 QEM could be: It is not powered on, duplicate IP address, cables not connected, or gateway address/network settings. Also refer to the troubleshooting section.

Type the *User ID* and *Password* and click **Login**. Refer to page 2-1. When a correct user name and password is entered the dashboard page should appear.

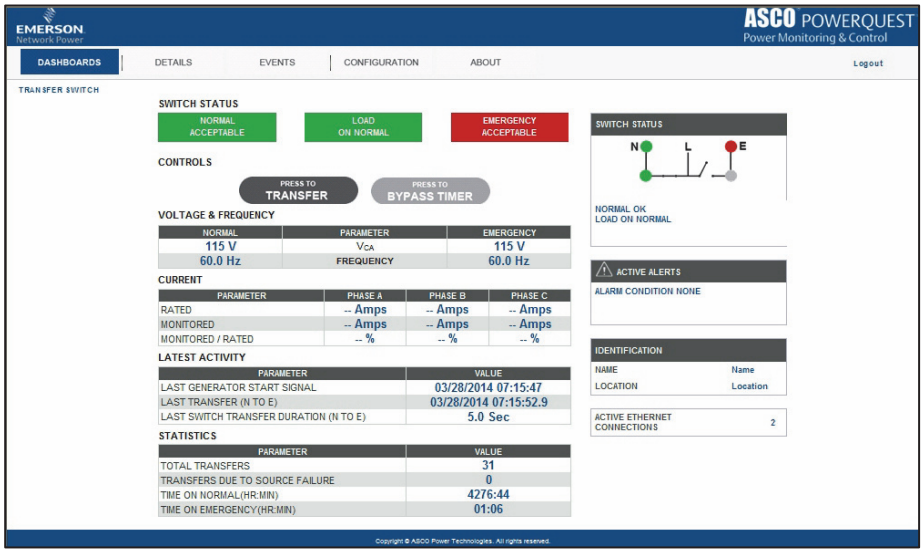


Figure 3-2. Dashboard page (typical for New Series 300 Transfer Switch with Acc. 72EE)

Webpage Design and Navigation

The web pages provide easy movement between pages. Tabs with drop-down boxes at the top allow navigation between pages. Navigation is typically one-level deep. Figure 3-3 shows the navigation bar and drop-down boxes.

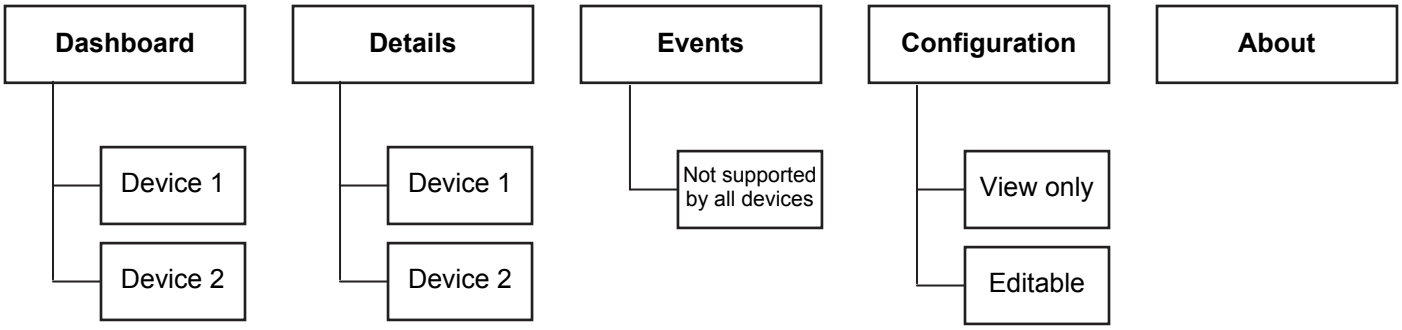


Figure 3-3. Navigation bar and drop-down boxes.

- The **Dashboard** pages display dynamic data for each device; they update every second.

  Transfer Switch
  If the 5140 QEM is an Acc. 72EE on a New Series 300 Transfer Switch, the device is **Transfer Switch**.
  Click **Transfer Switch** to display the transfer switch status, voltage and frequency, activity, statistics, alerts, time delays, and identification. The load can be transferred or retransferred via the *Controls* area of the page (requires *control* or *admin* access level).

  NOTE The Serial Feature 17 must be enabled in the Group G Controller, firmware version 11 or higher, to allow load transfer.

  Power Meter
  If the 5140 QEM is used with a 5210 Digital Power Meter, the device is **Power Meter**.(Normal, Emergency, Load on a transfer switch or Other for stand-alone applications) Click **Power Meter** to display the source status, voltage and frequency, activity, statistics, alerts, time delays, and identification.

- The **Details** pages generally show static data or settings information for each device.

  Transfer Switch
  If the 5140 QEM is an Acc. 72EE on a New Series 300 Transfer Switch, the device is **Transfer Switch**.
  Click **Transfer Switch** to display a page similar to the transfer switch dashboard page, but it has additional data.

  Power Meter
  If the 5140 QEM is used with a 5210 Digital Power Meter, the device is **Power Meter** (Norm, Emer, Load).
  Click **Power Meter** to display a page similar to the power meter dashboard page, but it has additional data.

- The **Events** page shows event information captured from the ASCO devices, if supported. It shows in log number order, the date and time, type, and cause of each event. The 5140 QEM does not add additional events.

- The **Configuration** pages are of two types: a page for viewing settings (read only) and a page for changing the configuration of the 5140 QEM. In Edit, the IP addresses can be changed, the SNMP and SMTP can be configurationed, and the users can upgrade the 5140 QEM firmware.

- The **About** page shows all of the devices possible and displays detailed device identification.

  If the 5140 QEM is an Acc. 72EE on a New Series 300 Transfer Switch, one device is the transfer switch **Controller** (Group G).

- Particular web pages, or the data of those pages, will be dependent on the devices connected to the 5140 QEM.

Modbus / TCP (for Monitoring Systems)

The 5140 QEM can act as a Modbus/TCP server to provide data to a Modbus client on demand. The 5140 QEM looks transparent to the Modbus/TCP client. The Modbus register in the downstream device looks like it is inside the 5140 QEM. Because the 5140 QEM acts as a data concentrator, the data from downstream devices is constantly refreshed and available in the 5140 QEM. This design results in a very fast turn-around time.

Accessing Modbus/TCP Data

Accessing parameters by Modbus/TCP requires three components: the IP Address, the device address, and the Modbus Register number. Modbus/TCP is always enabled in the 5140 QEM.

IP Address

The IP Address required to allow a client the ability to communicate to the 5140 QEM is defined in the configuration pages of the 5140 QEM web server. Usually the Modbus/TCP Client is on the same network as the Modbus/TCP server (the 5140 QEM).

Device Address

The 5140 QEM maps the Modbus data using the downstream device address. This is the device address needed when configuring the Modbus/TCP client. This address can be accessed from the **About** page of the 5140 QEM webpage or by going to the enclosure of the device and using the LCD screen and push buttons to locate the address from the settings page of the device.

Modbus Register

The Modbus register map is the same as that of the downstream device. As an example, the line-to-line voltage (A-B) of the New Series 300 Transfer Switch's Group G Controller is at register address 40017. Reading this same register from the 5140 QEM will provide the data from the Group G Controller to the Modbus/TCP client.

The well known TCP port for Modbus/TCP is 502. This port setting is done on the Configuration/Edit page. The port is defaulted to 10001. For an example interface using the *Modbus Test Suite* refer to document 381339-319.

ASCOBusII / TCP Interface

ASCOBusII is a proprietary protocol designed by ASCO Power Technologies for use with ASCO 5700 & 5900 Series CPMS systems. Accessing ASCOBusII data requires an ASCO Power Technologies technician. ASCOBus II is always enabled in the 5140 QEM.

SNMP Interface

The Simple Network Management Protocol (SNMP) was created as a way to monitor and manage network devices and hosts. SNMP is mostly a tool for network managers. Because of its simplicity it has also been used as a way to monitor other devices (like the 5140 QEM). SNMP is defaulted to disabled and needs to be enabled to use.

A Management Information Base (MIB) file allows a SNMP client the ability to understand the structure of the management data in a network device (in the case, the 5140 QEM).

5140 QEM Support

The 5140 QEM acts as a SNMP agent, providing data to a SNMP Manager on demand. The 5140 QEM supports the GET, GETNEXT, GETBULK, TRAP, and RESPONSE commands (SNMP v1 and v2). The 5140 QEM does not support the SET or INFORM commands (SNMP v1 and V2). Also, the 5140 QEM does not support SNMP v3.

SNMP Configuration and Interface

To enable SNMP functionality in the 5140 QEM, go to the **Configuration → Edit Mode** web page. Click the box. Configuring the SNMP master varies depending upon the client itself but needs the same base information:

- The IP address of the 5140 QEM
- The MIB file.
- The registers that will be read. Because these registers will be predefined in the MIB, they can usually be dragged and dropped in the SNMP master once the MIB is imported
- Details of configuring the SNMP master are master dependent.

To configure the 5140 QEM SNMP for capturing and sending traps, go to the **Configuration → Edit Mode** web page. The list of alarms that the 5140 QEM monitors is listed in the Alarms Configuration window. Note that these alarms are also used to initiate email alerts if SMTP is enabled. The alarms available are shown in Figure 5-2.

On the **Configuration** web page of the 5140 QEM, type the IP address of the computer that is running the SNMP master. Both devices should be on the same subnet or the Gateway Address in the Ethernet Module window.

Details of configuring the SNMP master to view TRAPs are master dependent.

For a SNMP master configuration using the *iReasoning* master, refer to document 381339-320.

iReasoning, copyrighted by iDeskCentric Inc.

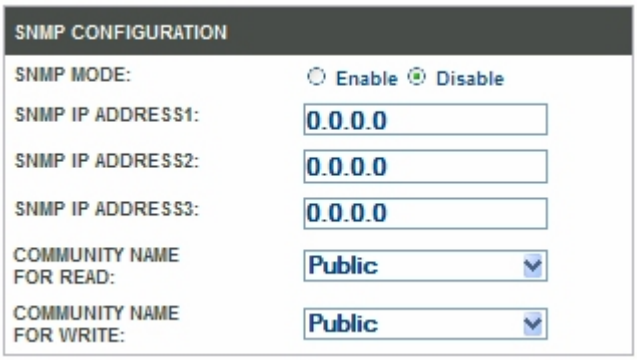


Figure 5-1. SNMP Configuration screen.

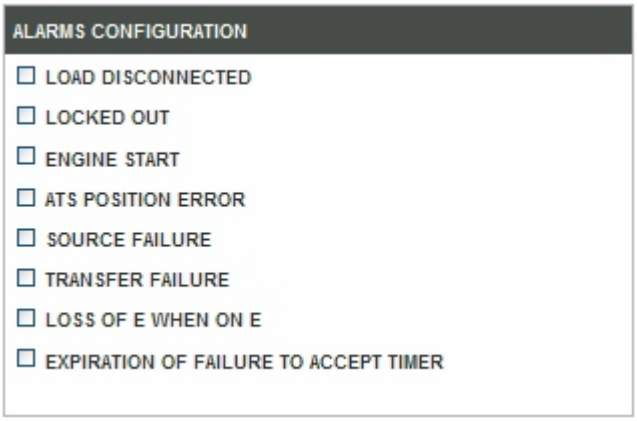


Figure 5-2. Alarms Configuration screen.

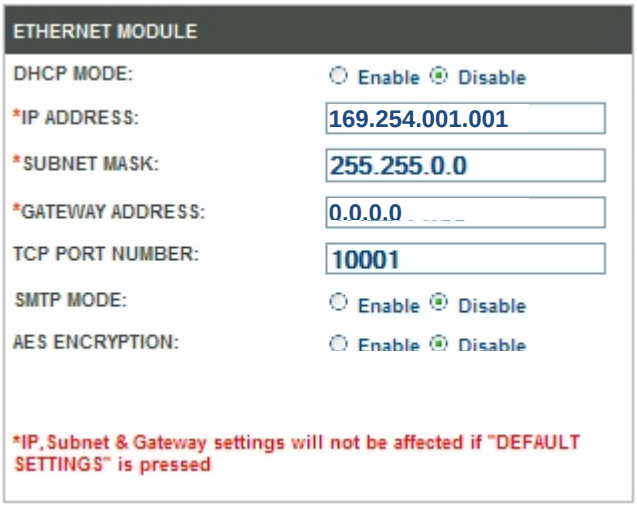


Figure 5-3. Ethernet Module configuration screen.

SMTP Interface

The Simple Mail Transport Protocol (SMTP) facilitates the sending of email alerts to users when alarms occur. By using this feature users are able to have important device status *pushed* to them rather than having to constantly monitor status. SMTP operation requires that the user has the email address of the destination email as well as the *Server IP Address* of the local network. Usually the IT department needs to be contacted for this feature.

A Management Information Base (MIB) file allows a SNMP client the ability to understand the structure of the management data in a network device (in this case, the 5140 QEM).

5140 QEM Support

The 5140 QEM can send emails to up to 5 email addresses. All the emails sent include the same text and alarm data: name, location, alarm type, and time. Emails are sent based upon alarms that are selected from a predefined list.

SMTP Configuration and Interface

To enable the SMTP functionality in the 5140 QEM go to the **Configuration → Edit Mode** web page. It is enabled when a valid address is typed into one of the email ID textboxes, a valid server IP Address is entered, a valid *From email ID* is entered, and at least one Alarm box is checked in the *Alarms Configuration* window.

Configuring the SMTP needs the following information: the email address of the destination email(s), the email address of the sender, the Server IP Address, Username (this can be anything, there are no restrictions), the correct Alarm triggers selected. Choices are shown in Figure 6-2.

Note that these Alarms are also used to initiate TRAP alerts if SNMP is enabled.

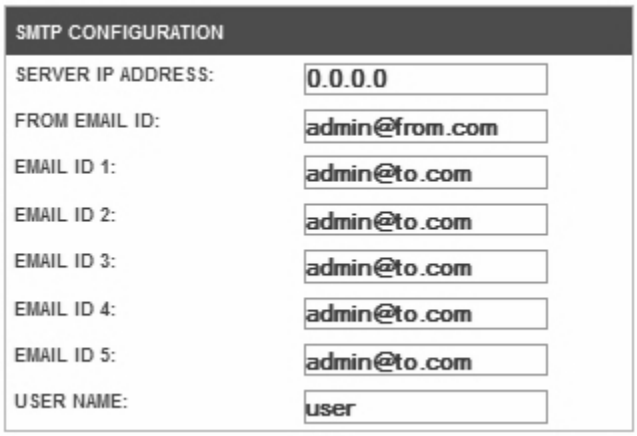


Figure 6-1. SMTP Configuration screen.

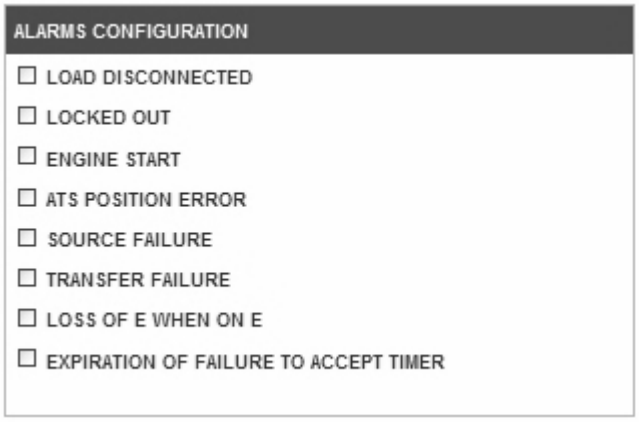


Figure 6-2. Alarms Configuration screen.

QEM Configuration Details

The 5140 QEM requires minimal configuration for most applications. Webpages allow the user to change how the 5140 QEM functions; only one webpage requires an understanding of the system network.

Configuration	Description
Configuration → View Mode	This webpage allows users to change the password of users at their access level or lower. See page 2-1.
Configuration → Edit Mode	This webpage is where most of the network type settings can be done. Access is restricted to ***admin*** users only. Click the ***Edit Mode*** drop-down box and log in. The user (admin level) can update the firmware. See Appendix 1.

Configuration → Edit Mode

This webpage allows configuration of general IP address related settings, SNMP and SMTP configuration, encryption support (if offered), and network settings. These settings are divided into four windows:

- The **SNMP** window configuration setup is discussed in the SNMP section.
- The **SMTP** window configuration setup is discussed in the SMTP section.
- The **Alarms Configuration** window presents a list of alarms that can be activated. Enabling these alarms affects both the email data sent as part of SMTP functionality as well as the TRAP use in the SNMP configuration if either of these protocols is enabled. See the SNMP and/or SMTP sections, if applicable.
- The **Ethernet Module** window includes these sub areas:

  Enabling **DHCP** (Dynamic Host Configuration Protocol) mode allows the IP address of the 5140 QEM to be set by a DHCP serer – usually as part of an IT administered network. This is rarely used due to the need for a network to be well defined, usually done using static IP addresses.

  The **IP** address, **Subnet** mask and **Gateway** address are network settings that will often be provided by the network manager. The default settings are 169.254.1.1, 255.255.0.0 and 0.0.0.0, respectively. Further information on changes to these settings should be addressed by the network manager.

  The **TCP** port number might need to be changed if a BMS or SCADA system will be interfacing to the 5140 QEM. This setting will usually only be changed by an ASI technician.

  The **AES Encryption** port and the ability to enable AES Encryption is used in conjunction with an ASCO Power Technologies monitoring solution, BMS, or SCADA system to add additional security. Both the 5140 QEM and the Ethernet master must use the same 128 bit encryption and communicate using the same port. Usually, particularly on LAN, this feature is not used. On some international non-encrypted versions these settings will not be available.

  The **SMTP Mode** enable option is discussed as part of the SMTP section.

  The **Device Termination** enable capability works in conjunction with the downstream data network. This setting is enabled by default and should be left enabled.

  The general recommendation is that the settings be left as default when possible. Usually the changing of the IP Address is all that is required.

After any changes are made to the configuration page, click the **Press to SAVE** button.

Note: Changing the Ethernet or SNMP Configuration will reset the 5140 QEM; a message appears that the 5140 QEM is reset. In a web browser, pop-up messages should be allowed. Otherwise, the 5140 QEM will not reset, and its webpage will display the older configuration. Click the **OK** button and close the pop-up window.

Firmware Upgrade

The 5140 QEM firmware can be upgraded over the Ethernet. You need a computer connected to the 5140 QEM over the Ethernet, an ASCO Power Technologies approved **.bin** file, and the correct password privileges.

Firmware upgrade capability is accessed on the **Configuration → Edit Mode** page.

1. To start a firmware upgrade, click the **Press to Upgrade Firmware** button on the bottom right corner of the **Configuration → Edit Mode** page.
2. A pop-up window appears. Click the **Continue** button, then close the pop-up window.
3. Close the browser window. Then open the browser again. Enter the IP address of the 5140 QEM (see page 2-1).
4. Point to and install the **.bin** file. The install should take less than 10 seconds.
5. After a successful upgrade, a pop-up message *FIRMWARE UPGRADE COMPLETED* appears. Click the **Reset** button.
6. Close, then reopen the browser window again. Enter the IP address of the 5140 QEM (see page 2-1) to view web pages.

Troubleshooting

⚠ DANGER To avoid possible shock, burns, or death, deenergize all electrical sources to the transfer switch before working on the 5140 QEM.

Status Lights (LEDs)

Power light

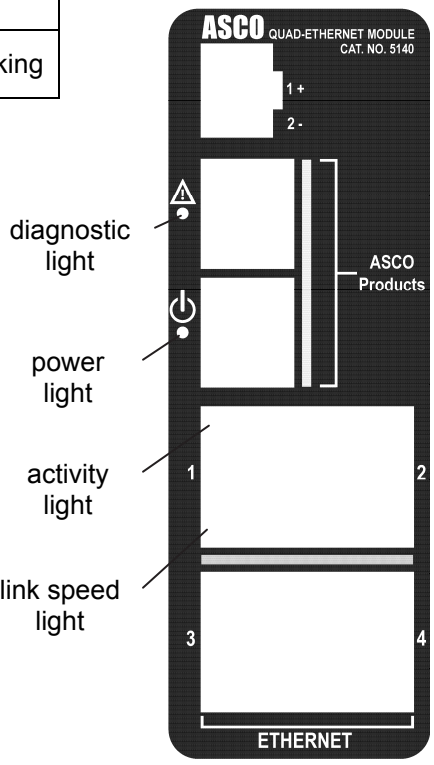
This light should be on under normal operating conditions

LED Name	Color	Status	Description
Power	Green	off	5140 QEM is not energized, it is turned off
		on	5140 QEM is energized, it is turned on and working

Ethernet Connection Lights

These lights should be blinking under normal operating conditions

LED Name	Color	Status	Description
Activity	Green	off	There is no activity on the link
		on	Flashing indicates activity on the link
Link Speed	Yellow	off	There is no link connection
		on	There is a link connection



Diagnostic Light

This light should be off under normal operating conditions

LED Name	Color	Status	Description
Diagnostic	Red	Solid on	5140 QEM in boot loader (starting up)
		off	5140 QEM in normal operating condition
		1 blink	FRAM checksum error
		4 blinks	Duplicate IP address on the network

Reset Button

A reset button (hole in the top) is provided to reset the 5140 QEM to original default settings. These settings are: IP address, subnet mask, gateway address, TCP port number, and reply timeout. The reset button should only be used if you forget the IP address. (see page 2-1).

Web Pages are not accessible

If the 5140 QEM web page is not accessible, try the following procedure:

1. Open the command prompt on the computer. Type *cmd*
2. To monitor network connectivity status, type *Ping xxx.xxx.xxx.xxx* in command prompt.
3. The default prompt of the 5140 QEM is 169.254.1.1 (see page 2-1).
4. To monitor continuous network connectivity status, type *Ping xxx.xxx.xxx.xxx -t* in command prompt.

Types of Data/Control found on Web pages

The following types of data and control are provided on 5140 QEM web pages, depending on the connected devices.

Transfer Switch Dashboard web page (for New Series 300 Transfer Switch with Group G Controller)

- Switch Status, Active Alerts, Timers
- Transfer Switch – Control Capability (firmware version 11 or higher)
- Voltage, Frequency, and Current Monitoring
- Transfer Switch / Generator Statistics

Transfer Switch Details web page (for New Series 300 Transfer Switch with Group G Controller)

- Pickup and Dropout Voltage Settings (settings for view only)
- Frequency Trip Settings
- Engine Exerciser Settings
- Active Alerts and Timers
- Transfer Switch and Engine Status

Power Meter Dashboard web page

- Energy Consumption – Net KWH, KVAR, KVA
- Transfer Switch Rated Current Utilization
- Power Quality (THD)
- Power Measurement – KW, KVA, KVAR, PF
- Voltage (L-L and L-N), Frequency, and Current Measurement
- Current date and time

Power Meter Details web page (settings are view only)

- Energy Consumption
- Historic KW Demand
- Maximum Load Demand Chart
- Power Measurement – KW, KVA, KVAR, PF
- Voltage, Current, Frequency, Power, and PF Measurement
- PT and CT ratios

Event Log page (5140 QEM displays up to 300 events with Accessory 11BE)

Events page shows the controller events logged into the 5140 QEM. Data included: event type, cause, timestamp.

Configuration web page

- There are two Configuration pages. One is viewable only; the other allows changes to the settings (Admin level).
- Viewable and editable are IP, TCP, and Communication Settings as well as SNMP and SMTP settings.
- The user can change device names and locations (these are only changes that can be made to downstream devices).
- The Configuration section is where a user can change the passwords (see page 2-1).
- Firmware Upgrade access (see Appendix 1).

About page

- The **About** page provides firmware versions of the 5140 QEM and devices that are connected downstream.

Glossary of Abbreviations and Terms

The following abbreviations are used in this manual.

Abbreviation	Definition and explanation
Acc. 72EE	Accessory 72EE, designation for 5140 QEM when provided with a New Series 300 Transfer Switch
AES	AES Encryption
ASCO	ASCO Power Technologies, Emerson Network Power
ATS, TS	Automatic Transfer Switch
BMS	Building management system
CMD	Command
CPMS	Critical Power Management System, ASCO 5700 or 5900 Series
DIN	35 mm DIN rail for mounting the 5140 QEM
DPM	Digital Power Meter, ASCO 5210
Gateway	Software or a computer running software that enables two different networks to communicate
Group G	Controller used on New ASCO Series 300 Transfer Switches
IT	Information Technology, an IT professional manages the computers and networks for a business
IP	Internet Protocol, provides rules for sending and receiving data packets between nodes through the Internet
LAN	Local Area Net, is a computer network limited to a small area
MAC	Media Access Control, is a hardware ID number that uniquely identifies each device on a network
MIB	Management Information Base
Modbus	A serial communications protocol
Ping	A protocol used to determine the presence of a host on the Internet
QEM	Quad Ethernet Module, ASCO Catalog 5140
SCADA	Supervisory Control And Data Acquisition system
SMTP	Simple Mail Transport Protocol, used for sending e-mail over the Internet
SNMP	Simple Network Management Protocol, used for exchanging management information between network devices
Subnet Mask	A number that defines a range of IP addresses that can be used in a network
TCP	Transmission Control Protocol, verifies delivery of data packets
THD	Used in Power Quality Meter
TRAP	SMNP notification from Agent to Manager

Communication Address Form for Quad-Ethernet Module (QEM)

Row No.	IP Address	Subnet mask	Gateway	ATS Serial No.	ATS Catalog No.	Address set in ATS Controller*	Address set in DPM
1							
2							
3							
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Instructions

Fill in the information for each 5140 Quad-Ethernet Module (Acc. 72EE) provided with a New Series 300 Transfer Switch and/or 5210 Digital Power Manager.

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